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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/078,243	02/14/2002	Vaidyanathan Kripesh	ALLENG4.001AUS	3258

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EXAMINER

GURLEY, LYNNE ANN

ART UNIT	PAPER NUMBER
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2812

DATE MAILED: 01/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/078,243

Applicant(s)

KRIPESH ET AL.

Examiner

Lynne A. Gurley

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-52 and 79-86 is/are pending in the application.
- 4a) Of the above claim(s) 23-52 and 82-85 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22, 79-81 and 86 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.


LYNNE A. GURLEY

PRIMARY PATENT EXAMINER

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/3/05 has been entered.

Currently, claims 1-52 and 79-86 are pending. Claims 53-78 are canceled. **Claims 23-52 and 82-85 have been withdrawn**, without traverse, in the response filed 6/22/04. Claims 79-81 and 86 are new as of the amendments filed 1/12/04 and 6/22/04, respectively.

Note that claims 23-52 and 82-85 should be referred to as “(withdrawn)” in the RCE submitted 1/3/05.

Applicant should refer to the withdrawn claims 23-52 and 82-85 in the response to this office action as “(withdrawn)” as is the current practice concerning submission of claims by the Office.

Specification

1. The disclosure is objected to because of the following informalities: The chart in Appendix B is illegible.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-2, 4-6, 7-8, 10-11, 13-15, 16, 18, 20-22, 79-81 and 86 are rejected under 35 U.S.C. 102(b) as being anticipated by DiGiacomo et al. (US 5,266,522, dated 11/30/93).

DiGiacomo shows the method as claimed and as shown in figures 1-7 and corresponding text with Si chip 12, metal interconnect 14, and **noble metal 20** (a single metal 20) deposited on the exposed metal interconnect. The noble metal increases the bonding nature of the interconnect (layer 20 makes possible wire bonding (column 6, lines 2-3); see diffusion zone 28 in figure 4; also see column 5, lines 67; column 6, lines 1-3, lines 22-24, lines 35-49 and especially, lines 53-67 and column 7, lines 1-18). See column 1, lines 43-50; column 3, lines 1-3; column 4, lines 30-60; column 5, lines 4-3 and lines 54-58; column 6, lines 1-67; column 7, lines 1-23; column 8, lines 3-17) for wire bonding processes, substrate materials, and copper interconnect. Insulating layer 32 in figure 5 is a passivation layer.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2812

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 3, 9, 12, 17, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over DiGiacomo et al. (US 5,266,522, dated 11/30/93) in view of Pace (US 2003/0124829, dated 7/3/03).

DiGiacomo shows the method substantially as claimed and as described in the preceding paragraphs.

DiGiacomo lacks anticipation only in not teaching that: 1) the metal wire composes aluminum or gold or metal alloy; and 2) the chemical process comprises an immersion process, a dip process or an electroless plating process.

Art Unit: 2812

Pace teaches the conventional deposition process of plating a metal over the bonding pad surface in order to form a more reliable interconnection [0011]-[0012], [0017], [0020]-[0023].

It would have been obvious to one of ordinary skill in the art to have used plating and to have had the wire formed of aluminum or gold, in the method of DiGiacomo, with the motivation that Pace teaches that electroplating is conventional and that gold plating over the bonding pad is conventional.

Response to Arguments

8. Applicant's arguments filed 1/3/05 have been fully considered but they are not persuasive.

9. In response to Applicant's remarks, pages 10-14, wherein Applicant states that DiGiacomo does not disclose a noble metal directly on the exposed portion of the metal interconnect, the Examiner holds the position that the claim language does not preclude additional layers being present on the exposed portion of the interconnect 14. In fact, **technically, these layers, including chromium layer 16 and nickel layer 18, become an extension, or part of the interconnect** and, they are indeed on the exposed portion of 14 just as the noble metal layer 20. Furthermore, in response to Applicant's remark, page 10, section 1, specifically, the layer 20 does correspond to the claimed noble metal layer. **Broadly interpreted noble metal layer 20 is deposited directly on the multilayered interconnect, the term "interconnect" encompassing the additional layers deposited on 14, such as chromium layer 16 and nickel layer 18.**

Art Unit: 2812

10. In response to Applicant's remarks, pages 10-11 and 12-13, wherein Applicant states that DiGiacomo does not disclose performing a (maskless) chemical process that converts a layer of the noble metal into a bondable layer compatible with a wire bonding, the chromium layer is not the noble metal layer that the Examiner has referenced in the office action. **Layer 20**, which is clearly discussed in DiGiacomo as a **noble metal layer**, is the layer that the Examiner has referenced. Layer 20 is on the exposed portion of the interconnect and is clearly deposited, as stated in DiGiacomo to be a bondable layer compatible with wire bonding by conventional methods (DiGiacomo, figures 1-2 and 4, wherein 4 shows the noble metal layer 20 being bonded to the wire 26, with a diffusion zone 28 showing that it has become a bondable layer; column 5, line 67; column 6, lines 1-3, lines 36-48 and lines 58-67; column 7, lines 1-18). Since the layer 20 is deposited by conventional means, this includes all of the conventional methods Applicant discloses (examples "such as...etc.", listed on page 6, lines 9-25) such as electroless plating deposition. According to Applicant, these conventional deposition processes make the noble metal atoms and the interconnect atoms mix with one another and form the bondable layer. There does not appear to be any criticality in this step or any novelty, since these deposition processes appear to be conventional and, well known for the noble metals, such as Au-gold. Applicant's remarks appear to be drawn to an obviousness that stems from the very conventional deposition process of the noble metal itself. The conventional deposition process (i.e. the maskless chemical process) of the noble metal is what makes it, according to Applicant, convert to a bondable layer. The Examiner finds that the claimed noble metal, will always exhibit the bondable layer trait, as long as it is deposited by conventional means. Therefore, the noble metal

Art Unit: 2812

layer 20 is deposited by performing a maskless chemical process (conventional deposition process) that converts the noble metal layer into a bondable layer compatible with wire bonding.

11. In response to Applicant's remarks, page 11, the chromium layer is not the noble metal layer, layer 20 is the noble metal layer. Therefore, Applicant's remarks concerning the chromium layer 16 is moot. Layer 20 is deposited by conventional means, which as stated above, leads to the conversion by a chemical process.

12. In response to Applicant's remarks, page 11 in the summary, there is no need to modify the DiGiacomo reference to exclude the layers 16 and 18, since they are included in the multilayered interconnect, as broadly interpreted by the Office.

In response to Applicant's remarks, page 12, regarding claim 86, the noble metal and chemical process are shown in the reference as discussed previously.

13. In response to Applicant's remarks, pages 12-13, with respect to the dependent claims only, in reference to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Pace and Eldridge are referenced only to teach the missing elements of DiGiacomo. Pace is used as a generalized reference, which teaches the conventionality of plating gold metal

Art Unit: 2812

over the bonding pad surface, in order to form a more reliable interconnect. Pace also teaches aluminum in the bonding process [0022]-[0023]. Both DiGiacomo and Pace are compatible in that they are both concerned with the reliability of the bonding process, wherein the improvement of the deposition of metal, on metallic sites on the substrate and, then subsequent bonding of the metal to other devices is a concern [0004]-[0005]. Pace is simply referenced to teach the conventional way of depositing the metals on the metallic sites for the same purpose of DiGiacomo, reliable bonding. Therefore, the Examiner finds the combination of DiGiacomo and Pace satisfactory.

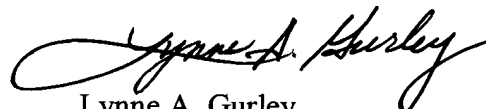
The Examiner takes the position that DiGiacomo and DiGiacomo in view of Pace show the method as claimed. It is suggested that Applicant further define the invention in terms of the processing steps and/or structure to preclude that which is taught by the prior art references.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynne A. Gurley whose telephone number is 571-272-1670. The examiner can normally be reached on M-F 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on 571-272-1679. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2812

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Lynne A. Gurley
Primary Patent Examiner
Art Unit 2812

January 14, 2004